What is claimed:

1. A method of estimating the temperature of the air in the internal cavity of a tire in which:

prior to normal operation, a series of running tests are carried out on the tire provided with a means of measuring the temperature of the air in the cavity at given speeds V and external temperatures T_{amb}, the said tire supporting a given load and the said cavity being at a given internal relative pressure, and an adjustment is made to a function giving the temperature of the internal air T_{ai} according to the said parameters of speed and external temperature:

$$T_{ai} = F(V, T_{amb});$$

in normal operation, the tire equipping a vehicle under the above conditions of load and relative pressure in the cavity, the said temperature of the internal air in the cavity is estimated according to the said speed of the vehicle and the temperature external to the said vehicle.

2. A method according to Claim 1, in which the internal temperature T_{ai} is given by:

$$T_{ai,n} = T_{SS} - (T_{SS} - T_{ai,n-1})\exp\left(\frac{4}{\tau}(t_n - t_{n-1})\right)$$

with: $T_{ai,n}$, internal temperature estimated at time t_n; $T_{ai,n-1}$, internal temperature estimated at time t_{n-1}; T_{ss}, internal temperature at thermal equilibrium under the given test conditions; τ, adjustment coefficient; and

$$T_{SS} = (a + bT_{amb})V^{(c+T_{amb}d)} + T_{amb}$$

where a, b, c and d are adjustment coefficients.

3. A method according to Claim 1, in which, during tests carried out prior to normal operating, the relative pressure in the said cavity corresponds, when cold, to the normal relative pressure of the said tire.

4. A method according to Claim 1, in which, the said tire forming part of a running-flat system, during tests carried out prior to normal operating, the relative pressure in the said cavity is substantially zero.

5. A method of detecting abnormal operating of a running-flat system intended to equip a vehicle, said system comprising, for each wheel, a tire forming with the said wheel a cavity, a means of detecting the internal temperature of the said cavity, a means of estimating the said internal temperature of the cavity and means for generating and transmitting an alarm, in which, in normal operation:

the internal temperature T_n in the cavity is measured periodically;

the said internal temperature T_{ai} is estimated periodically;

the said measured temperature and the said estimated temperature are compared; and

an alarm is triggered when the result of the said comparison satisfies a given relationship.

6. A method according to Claim 5, in which the said internal temperature is estimated as a function of the speed V of the said vehicle and of the temperature T_{amb} external to the said vehicle:

$$T_{ai} = F(V, T_{amb})$$

7. A method according to Claim 6, in which, prior to normal operating, the function F is determined from a series of running-flat tests on the said tire at given speeds V and external temperatures T_{amb}, the said tire being at its maximum load and the said cavity being substantially at zero relative pressure.

8. A method according to Claim 6, in which the internal temperature T_{ai} is given by:

$$T_{ai,n} = T_{SS} - (T_{SS} - T_{ai,n-1})\exp\left(\frac{4}{\tau}(t_n - t_{n-1})\right)$$

with: $T_{ai,n}$, internal temperature estimated at time t_n; $T_{ai,n-1}$, internal temperature estimated at time t_{n-1}; T_{ss}, internal temperature at thermal equilibrium under the given test conditions; τ, adjustment coefficient; and

$$T_{SS} = (a + bT_{amb})V^{(c+T_{amb}d)} + T_{amb}$$

where a, b, c and d are adjustment coefficients.

9. A method according to Claim 6, in which the estimation of the said internal temperature uses in addition the load Q on the said tire:

$$T_{ai} = F(V, T_{amb}, Q)$$

10. A method according to Claim 9, in which, prior to normal operating, the function F is determined from a series of running-flat tests on the tire at given speeds V, external temperatures T_{amb} and loads Q, the said cavity being substantially at zero relative pressure.

11. A method according to Claim 9, in which the estimation of the said internal temperature uses in addition the residual relative pressure P in the cavity in the said cover:

$$T_{ai} = F(V, T_{amb}, Q, P)$$

12. A method according to Claim 11, in which, prior to normal operating, the function F is determined from a series of running-flat tests on the tire at given speeds V, external temperatures T_{amb}, loads Q and residual relative pressures P.

13. A method according to Claim 5, in which an alarm is triggered when the measured temperature T_n exceeds the estimated temperature T_{ai} by a given threshold.

14. Method according to Claim 13, in which the said threshold is around 10 degrees Celsius.

15. A method according to Claim 5, in which, the said system comprising in addition a device warning of the deflation of the said cavity of the tire, the operating of the method of detecting abnormal operating of the said system is triggered as from the moment when the said deflation warning device has detected a predetermined deflation threshold.

16. A method according to Claim 15, in which the said deflation threshold corresponds to a relative pressure in the said internal cavity of around 0.7 bar.

17. A method according to Claim 5, in which the system comprises means of structural reinforcement of the said tire.

18. A method according to Claim 17, in which the means of structural reinforcement of the tire are a safety support disposed radially externally relative to the rim of the said wheel and intended to support the tread of the said tire in the event of loss of inflation relative pressure.

19. A method according to Claim 17, in which the means of structural reinforcement of the tire are inserted in the structure of the said tire.

20. A device for detecting abnormal operating of a running-flat system intended to equip a vehicle, the system comprising, for each wheel, a tire forming a cavity with the said wheel, comprising:

a means of measuring the internal temperature in the said cavity,

a means of estimating the said internal temperature,

a means of comparison between the measured internal temperature and the estimated internal temperature, and

means for generating and transmitting an alarm to the driver,

the said device being adapted for generating an alarm in normal operation when the result of the said comparison satisfies a given relationship.

21. A device according to Claim 20, in which the running-flat system also comprises a warning device for the deflation of the said cavity.

22. A device according to Claim 21, in which, the said deflation warning device comprising in particular a wheel module disposed in the cavity with at least one temperature sensor and one pressure sensor and signal transmission means, a central unit intended to be disposed in the vehicle chassis with means of transmitting/receiving and processing the data received, and means for generating and transmitting an alarm to the driver, the means of measuring the internal temperature of the cavity is the said temperature sensor.

23. A device according to Claim 22, in which the means of estimating the internal temperature is included in the said central unit.

24. A method of detecting abnormal operating of a tire intended to equip a vehicle, the said tire having an internal cavity and being provided with a means of detecting the internal temperature of the said cavity, a means of estimating the said internal temperature and means for generating and transmitting an alarm, in which, in normal operating:

the internal temperature T_n in the said cavity is measured periodically;

the said internal temperature T_{ai} is estimated periodically;

the said measured temperature and the said estimated temperature are compared; and

an alarm is triggered when the result of the said comparison satisfies a given relationship.

25. A method according to Claim 24, in which, in normal operating, the said internal temperature is measured according to the speed V of the said vehicle and the temperature T_{amb} external to the said vehicle:

$$T_{ai} = F(V, T_{amb})$$

26. A method according to Claim 25, in which, prior to the normal operating, the function F is determined from a series of running tests on the said tire at given speeds V and external temperatures T_{amb}, the said tire supporting a load corresponding to the normal maximum load and the said cavity being, when cold, at an internal relative pressure corresponding to the normal relative pressure.